

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1-10. (canceled).

11. (currently amended): A semiconductor switch driving circuit comprising:

a transformer;

at least one switching device, each comprising a gate terminal and an emitter terminal;

a primary side area provided on a primary side of the transformer for controlling current on the primary side of the transformer according to a control signal for controlling the at least one switching device; and

a secondary side area provided on a secondary side of the transformer for directly driving the at least one switching device,

wherein the primary side area and the secondary side area are arranged so as to select one operation from a selectively perform either a first operation mode in which a voltage between the gate terminal and the emitter terminal of the at least one switching device is kept either positive or negative during at least one cycle of the control signal, ~~or~~ and a second operation mode in which the voltage between the gate terminal and the emitter terminal of the at least one switching device is switched between positive and negative within one cycle of the control signal and perform the selected operation.

12. (previously presented): A semiconductor switch driving circuit according to claim 11, wherein, the primary side area is arranged so that power for controlling the at least one switching device is transmitted to the secondary side area, and back electromotive force caused when current flowing in the transformer is cut off is absorbed.

13. (previously presented): A semiconductor switch driving circuit according to claim 11, wherein the secondary side area receives a power supplied from the primary side area and transmits the power to a plurality of switching devices, such that the plural switching devices simultaneously operates in an identical manner.

14. (previously presented): A semiconductor switch driving circuit according to claim 11, wherein;

- a source of a P channel MOSFET is connected to a power terminal;
- a drain of the P channel MOSFET is connected to an anode of the diode;
- a cathode of the diode is connected to a first terminal of a primary winding of the transformer, so that back electromotive force between the first terminal and a second terminal of the primary winding of the transformer is inhibited when the P channel MOSFET conducts.

15. (previously presented): A semiconductor switch driving circuit according to claim 11, wherein;

a first control signal input terminal (PL) from which the control signal is input is connected to a base of a first NPN bipolar transistor (108) via a resistor (105) and a capacitor (104) respectively connected in parallel;

the base and an emitter of the first NPN bipolar transistor (108) are connected via a resistor (106) and the emitter is grounded;

a collector of the first NPN bipolar transistor (108) is connected to a gate of a first P channel MOSFET (110) via a resistor (107);

the gate and a source of the first P channel MOSFET (110) are connected via a resistor (109) and the source is connected to a power terminal (VDD), a drain of the P channel MOSFET (110) is connected to an anode of a diode (111);

a cathode of the diode (111) is connected to a drain of a first N channel MOSFET (114) and a first terminal (127a) of a primary winding of a transformer (127);

a gate and a source of the first N channel MOSFET (114) are connected via a resistor (113) and the source is grounded;

a second control signal input terminal (N) from which the control signal is input is connected to the gate of the first N channel MOSFET (114) via a resistor (112),

a third control signal input terminal (NL) from which the control signal is input is connected to a base of a second NPN bipolar transistor (120) via a resistor (117) and a capacitor (116) respectively connected in parallel;

a base and an emitter of the second NPN bipolar transistor (120) are connected via a resistor (118) and the emitter is grounded;

a collector of the second NPN bipolar transistor (120) is connected to a gate of a second P channel MOSFET (122) via a resistor (119);

the gate and a source of the second P channel MOSFET (122) are connected via a resistor (121) and the source is connected to the power terminal (VDD);

a drain of the second P channel MOSFET (122) is connected to an anode of a diode (123);

a cathode of the diode (123) is connected to a drain of a second N channel MOSFET (126) and a second terminal (127d) of the primary winding of the transformer (127);

a gate and a source of the second N channel MOSFET (126) are connected via a resistor (125) and the source is grounded;

a fourth control signal input terminal (P) from which the control signal is input is connected to the gate of the second N channel MOSFET (126) via a resistor (124); and

third and fourth terminals (127b, 127c) of the primary winding of the transformer (127) are connected to a center tap (135) which is connected to the power terminal (VDD) and is grounded via a capacitor (115).

16. (previously presented): A semiconductor switch driving circuit according to claim 13, wherein the switching devices are connected in series.

17. (previously presented): A semiconductor switch driving circuit according to Claim 16, wherein the switching device is an insulated gate bipolar transistor (IGBT).

18. (previously presented): A semiconductor switch driving circuit according to Claim 11, wherein the secondary side area has a Zener diode for preventing electromotive force generated on a secondary winding by back electromotive force caused on a primary winding of the transformer.

19. (previously presented): A semiconductor switch driving circuit according to claim 11, wherein;

a first terminal of a secondary winding of the transformer is connected to a first Zener diode;

a second Zener diode is connected to a gate of one of the at least one switching device via a first resistor;

terminals of the first Zener diode and the second Zener diode having the same polarity are directly connected in series;

a second terminal of the secondary winding of the transformer is connected to an emitter of the one of the at least one specific switching device; and

a second resistor and a capacitor are connected between the second Zener diode and the emitter of the one of the at least one switching device.

20. (currently amended): An electrotherapy apparatus for adapted to supply a high-voltage electric pulse to a living body, comprising:

a semiconductor switch driving circuit comprising:

a transformer;

at least one switching device, through which the high-voltage electric pulse is supplied,
each switching device comprising a gate terminal and an emitter terminal;

a primary side area provided on a primary side of the transformer for controlling current
On the primary side of the transformer according to a control signal for controlling the at least
one switching device; and

a secondary side area provided on a secondary side of the transformer for directly driving
the at least one switching device,

wherein, the primary side area and the secondary side area are arranged so as select one
operation from to selectively perform either a first operation mode in which a voltage between
the gate terminal and the emitter terminal of the at least one switching device is kept either
positive or negative during at least one cycle of the control signal, ~~or~~ and a second operation
mode in which the voltage between the gate terminal and the emitter terminal of the at least one
switching device switched between positive and negative within one cycle of the control signal
and perform the selected operation.